SONOMA COUNTY WATER AGENCY

FAX

FILE:PROJ/SVCSD TERTIARY TREATMENT
UPGRADE PROJECT 70-12-7 #30

DATE: **JUNE 19, 2006**

TO: **PLANHOLDERS**

FROM: **DALE ROBERTS, PROJECT MANAGER**

SUBJECT: **SONOMA VALLEY COUNTY SANITATION DISTRICT (SVCSD) TERTIARY TREATMENT UPGRADE PROJECT - SUBSTITUTION REQUEST FOR GPM CHEMICAL METERING PUMPS**

Attached is the completed Document 00660 (Substitution Request Form) for the subject substitution request. SVCSD has determined that the Verderflex Smart Peristaltic Metering Pump is not accepted as noted below.

Engineer does not have experience with GPM and has determined that the pumps listed in the Project Manual are best suitable for this application.

DOCUMENT 00660

SUBSTITUTION REQUEST FORM

During Bid Period To:	After Award of Contract To:
Dale Roberts, P.E. Sonoma Valley County Sanitation District Fax: 707-524-3782	Mathew Vail, Construction Management Sonoma Valley County Sanitation District Fax: 707-524-3791

Project: Tertiary Treatment Plant Upgrade

Bidder: GPM PUMPS, INC.

Subcontractor/Supplier: G3 ENGINEERING

Drawing Sheet Reference/Detail No: SECTION 11074

The undersigned Bidder submits for consideration the following equipment instead of the specified item for the above Project:

Section	Paragraph	Specified Item
11074	PAGES 1-4	PERISTALTIC CHEMICAL METERING PUMPS

Proposed Substitution: VERDER FLEX SMART PERISTALTIC METERING PUMPS

The undersigned encloses the information required herein. If this Document 00660 is being submitted by a Bidder wishing to use "equal" item(s) as provided in Document 00200 (Instructions to Bidders), the undersigned Bidder must also enclose the technical information (other than cost) otherwise required for a post-Award of Contract Request for Substitution ("RFS") under Section 01600 (Product Requirements). However, if this Document 00660 is being submitted under provisions of Contract Documents after Award of Contract, the undersigned Contractor must include all information required under Section 01600 (Product Requirements).

The undersigned has (a) attached manufacturer's literature, including complete technical data and laboratory test results, if applicable, (b) attached an explanation of why proposed substitution is a true equivalent to specified item, (c) included complete information on changes to Contract Documents that the proposed substitution will require for its proper installation, and (d) filled in the blanks below:

A. Does the substitution affect dimensions shown on Drawings? (If yes, please explain)

NO EFFECT

B. Are the manufacturer's guarantees and warranties on the proposed substitution items identical to those on the specified items? If there are differences, please specify each and every difference in detail.

YES

C. What effect does the substitution have on other contractors, trades, or suppliers?

NONE

D. What are the differences between the proposed substitution and the specified item? If proposed substitution has a color or pattern, provide a color board showing proposed substitution in relation to the other adjacent colors and patterns.

NO SIGNIFICANT DIFFERENCES, EQUAL FUNCTIONALITY

E. Will granting the requested substitution cause any schedule delay? (If yes, please explain)

NO DELAY

The undersigned Bidder certifies that the function, appearance, and quality of the proposed substitution are equivalent or superior to those of the specified item.

Submitted by:

GPM PUMPS, INC.
Bidder

Signature

JOHN C. LORSCHEIDER
Name

110 GATEWAY DR.
Address

MACON, GA 31210
City/State/Zip

Telephone: 877-476-3569

Date: 6/8/06

For Use by Owner:

___ Accepted ___ Accepted as Noted

X Not Accepted ___ Received Too Late

By: _____
Owner's Representative

Date: 19 JUNE '06

Remarks: SEE COMMENTS TO PLANHOLDERS.

END OF DOCUMENT

VERDER
Solutions in Pumping Technology

VERDERFLEX® SMART

VERDERFLEX Smart peristaltic dosing pump Model Smart C10

Capacity from 0,01 - 403 ml/min

The drive

- Rigid water protected housing (IP55)
- Large keypad to set direction of rotation for right/left and on/off operation
- Optional remote control (0 - 10V/4 - 20mA)
- Illuminated display easy to read from any direction
- The position of the pumphead allows in-line, „kink-free" pumping
- Multifunctional footadapter
- Coated Aluminium casing

The pumphead

- Easy-Fit tube saddle for changing tubes in seconds
- Self-adjusting tube clamps
- Housing manufactured from chemical resistant POM
- Front cover transparent plexi to see direction of rotation
- Multichannel capability, up to 4 channels simultaneously
- Pressure range 0 - 4 bar (special tubes are required for higher pressure ranges)
- Optional 3 or 6 rolls, pulsless version optional
- Saddlestatus detection (SSD) stops motor when the head is opened

The tube

Allthough the pumps can be operated with any tube material the VERDERPRENE proved as the best suitable. It has an excellent mechanical wear resistance and reaches a lifetime up to 8.000 hours. Chemically the VERDERPRENE is resistant against the most acids and caustics.

Technical data

Capacity	0,01 - 403 ml/min per channel
Speed	Max. 240 U/min
Control ratio	100:1
Multichannel	up to 4 channels
External signals	0 - 10V/4 - 20mA
Computer signals	No
Calibration	No
Anti Drop	No
Protection class	IP55
Quick start	Yes
Weight	12,5 Kg
Voltage	115V/230V
Frequency	50/60HZ
Power	120VA
Keypad	Yes

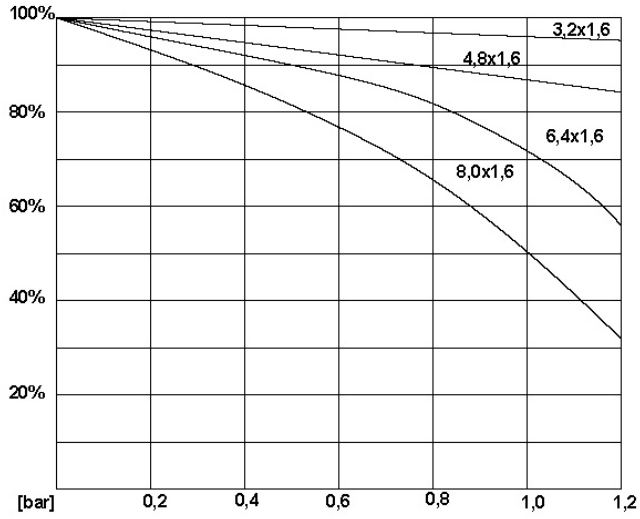
Capacity max. (ml/min) per pump channel

Smart C10	
Tube ID/WS (mm)	3 Rolls
0,5 x 1,6	5,2
0,8 x 1,6	9,4
1,6 x 1,6	52
3,2 x 1,6	185
4,8 x 1,6	403

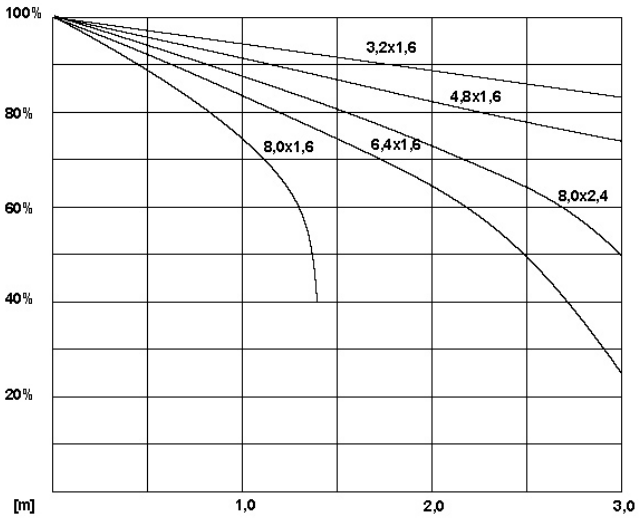
Measured with water at 20°C without pressure

Correction charts for discharge and suction

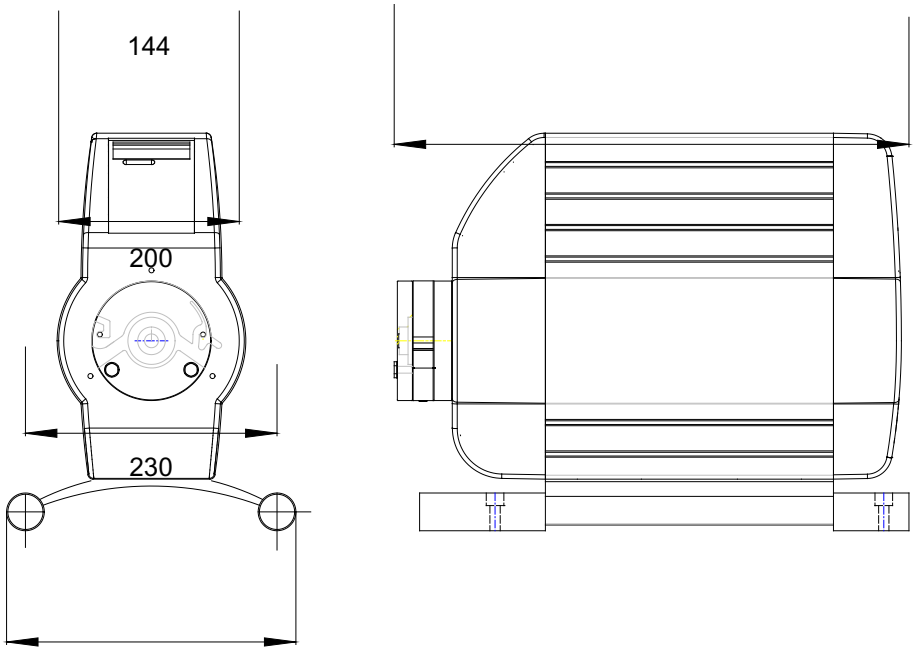
- Capacity dependent from the discharge head



- Capacity dependent from the suction head



Dimension drawing



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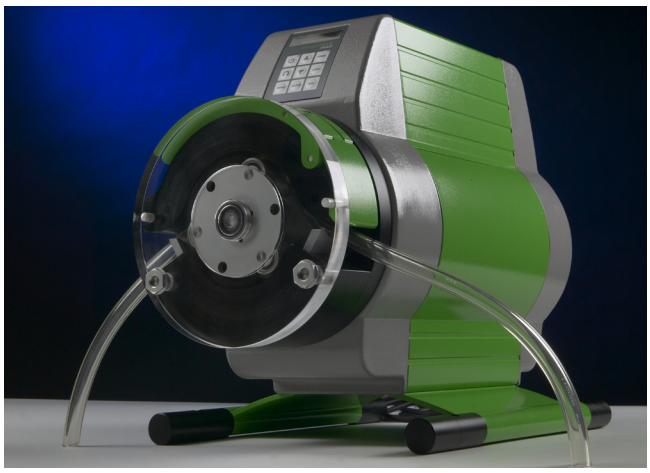
VERDER
Solutions in Pumping Technology

VERDERFLEX® SMART

VERDERFLEX Smart peristaltic dosing pump Model Smart C30



Capacity from 85 - 7.500 ml/min

The drive

- Rigid water protected housing (IP55)
- Large keypad to set direction of rotation for right/left and on/off operation
- Optional remote control (0 - 10V/4 - 20mA)
- Illuminated display easy to read from any direction
- The position of the pumphead allows in-line, „kink-free" pumping
- Multifunctional footadapter
- Coated Aluminium casing

The pumphead

- Easy-Fit tube saddle for changing tubes in seconds
- Self-adjusting tube clamps
- Housing manufactured from chemical resistant POM
- Front cover transparent plexi to see direction of rotation
- Multichannel capability, up to 4 channels simultaneously
- Pressure range 0 - 4 bar (special tubes are required for higher pressure ranges)
- Optional 3 or 6 rolls, pulsless version optional
- Saddlestatus detection (SSD) stops motor when the head is opened

The tube

Allthough the pumps can be operated with any tube material the VERDERPRENE proved as the best suitable. It has an excellent mechanical wear resistance and reaches a lifetime up to 8.000 hours. Chemically the VERDERPRENE is resistant against the most acids and caustics.

Technical data

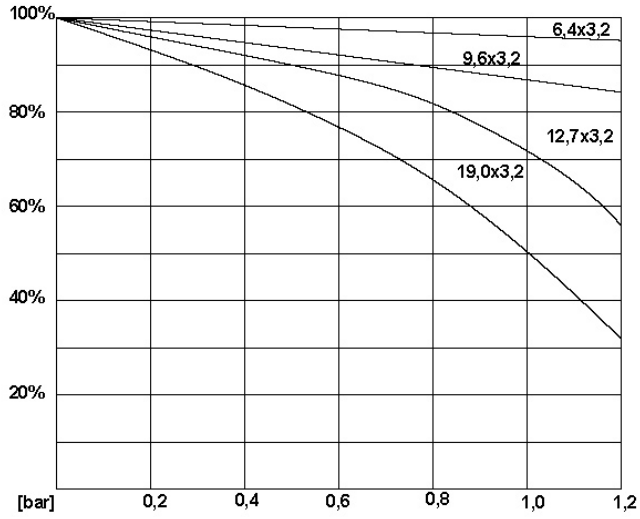
Capacity	85 - 7.500 ml/min per channel
Speed	Max. 240 U/min
Control ratio	100:1
Multichannel	up to 4 channels
External signals	0 - 10V/4 - 20mA
Computer signals	No
Calibration	No
Anti Drop	No
Protection class	IP55
Quick start	Yes
Weight	22 Kg
Voltage	115V/230V
Frequency	50/60HZ
Power	285VA
Keypad	Yes

Capacity max. (ml/min) per pump channel

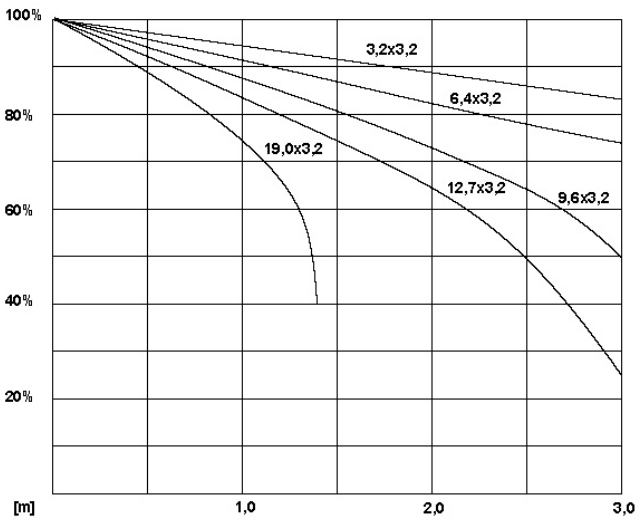
Smart C30	
Tube ID/WS (mm)	3 Rolls
0,5 x 3,2	1.520
0,8 x 3,2	3.550
1,6 x 3,2	5.500
3,2 x 3,2	7.500
	Measured with water at 20°C without pressure

Correction charts for discharge and suction

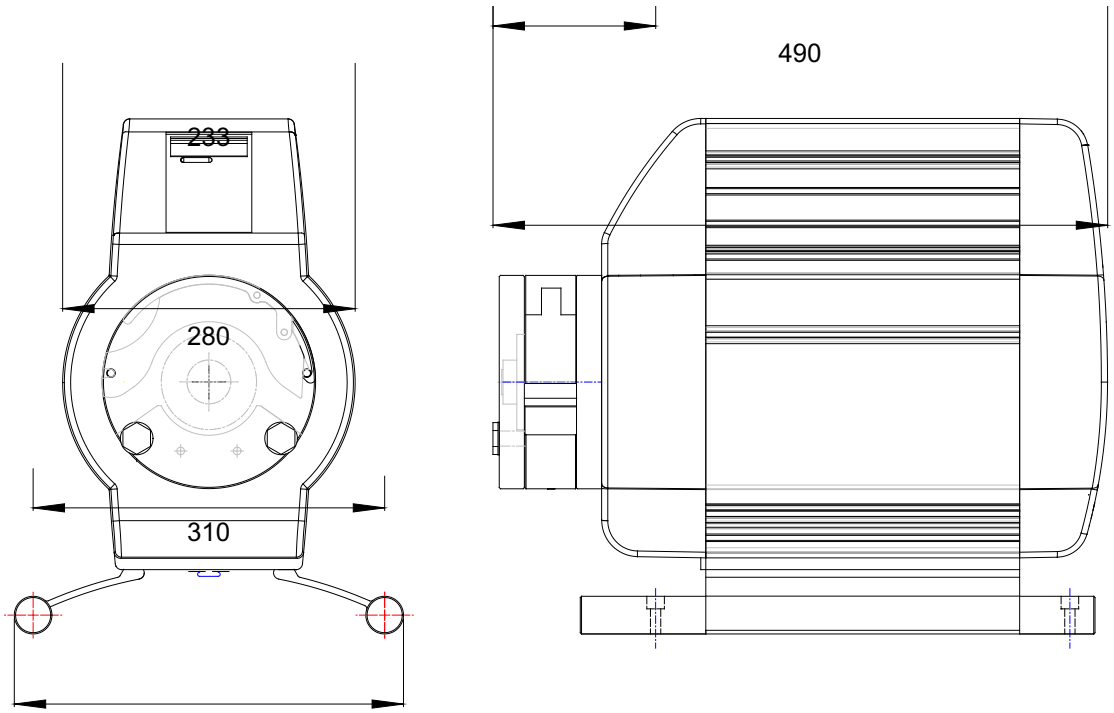
- Capacity dependent from the discharge head



- Capacity dependent from the suction head



Dimension drawing



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VERDERFLEX® SMART

Who says you cannot have it all?

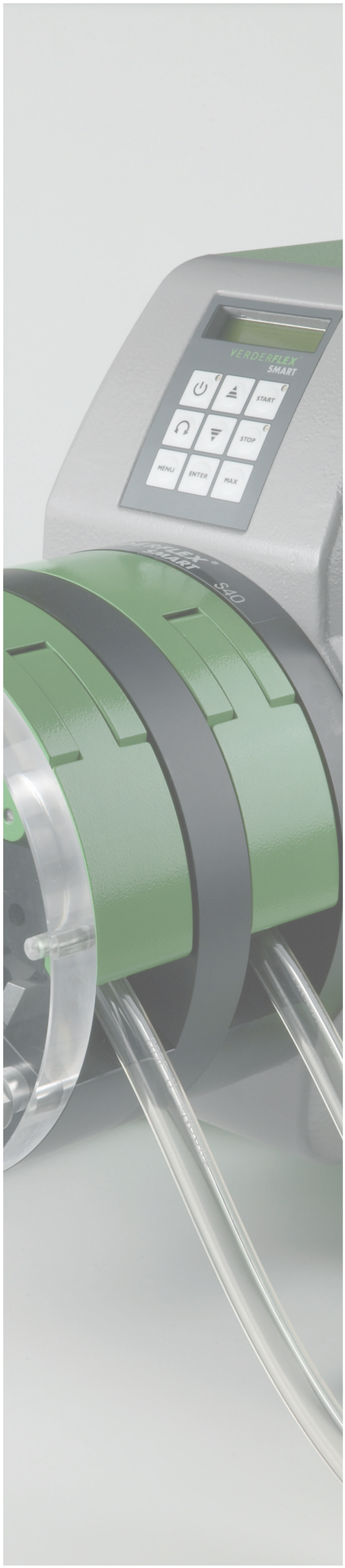
- Accurate dosing
- Difficult liquids
- Leakfree hygienic operation
- Easy to operate
- Easy to adapt in standard execution
- Unique design

Now you can.....
.....the solution is Smart

GPM PUMPS Inc.

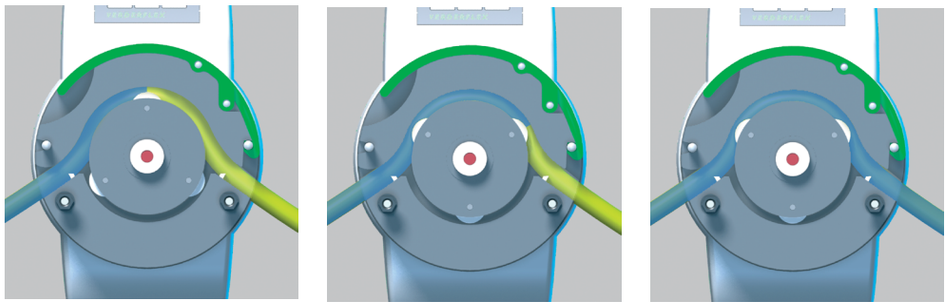
VERDER

Solutions in Pumping Technology



Peristaltic pump principle

The only pumping element for the peristaltic pump is the tube, the pump works by squeezing the tube with rollers. This means that the pump can run dry, self-prime and handle viscous or abrasive liquids, plus, as the tube is one complete unit, there are no seals thus making the pump leakfree and hygienic. Furthermore, because each rotation displaces a constant amount, the pump is excellent for dosing applications. Although this principle applies to all peristaltic pumps the difference is in the head and the drives.



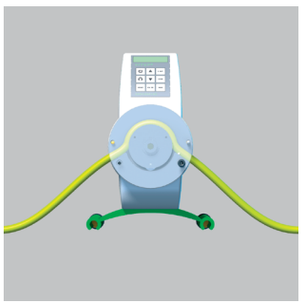
Transfer of the fluid

The Verder group's 25 years experience in peristaltic pumps has led to a completely new design of low pressure tube pump: the Verderflex SMART series.

Unique design

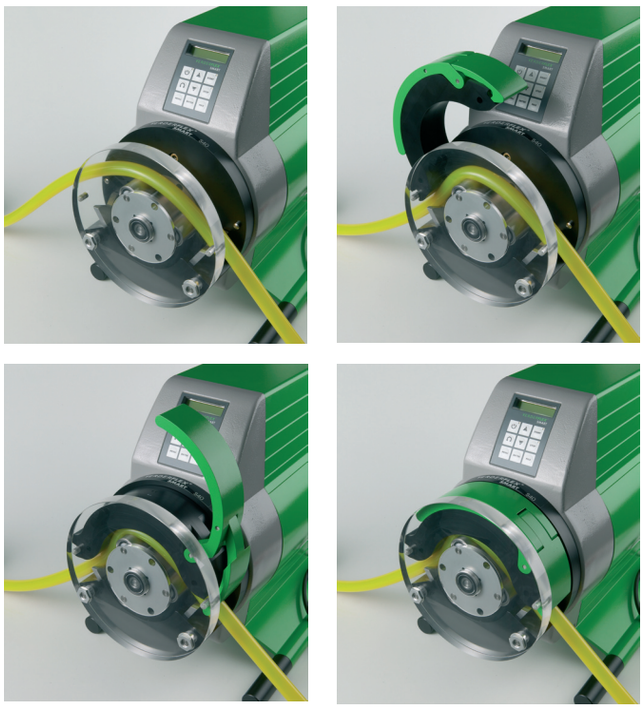
Verder has worked hard to create a design which meets the requirements of its customers, the Verderflex SMART series is a reliable, flexible, low pressure peristaltic pump. The actual design is the result of research carried out over recent years.

- The illuminated central display is easy to read from all angles and its menu has been designed so that it is simple and logical to navigate.
- As there is no pump head beside the display it can be operated by left and right handed people and the buttons have been made large enough to be operated even with gloves.



- The position of the pump head allows in-line, "kink free" pumping.

- The water protected design (IP55) means it is capable of withstanding harsh environments yet is also suitable for laboratory applications.
- The pump head has its own bearings, removing the load from the drives and therefore giving the pump a longer life.
- The safety standards of the pump include an emergency shutdown and an optional leak detector.
- The design offers the flexibility to choose between adjustable feet, wheels or a frame to make the pump portable.



Exchanging the tube

Easy to operate

The easy-fit tube saddle is designed for one handed operation and is based on the design of a ski boot fastener, allowing the tube to be loaded easily from above. After closing the saddle the pump head is ready for operation: the self-adjusting tube clamps mean no further action is needed to hold the tube in place. The shape of the tube clamps prevents the tube from kinking in the pump head, thus extending the hose life. Unlike other complex front loading systems, the Verderflex SMART series has a unique top loading design making tube changing a quick and easy operation. This also means that it is possible to attach further pump heads to be operated separately. Most current pumps only have a mechanical lock on the pump cover, however the SMART series has been fitted with an automatic shutdown to prevent any accidents.

The SMART series offers the flexibility to add further pump heads, up to a maximum of four, which allows the user to operate several lines from the same pump, while the adjustable feet keep the pump stable. If pulse-free operation is required, a second pump head can be attached to overlap / cancel out the pulses.

In applications where full control of the process is required, there is the option of adding a leak detector which stops the pump automatically and/or sounds an alarm.

Technical Details	
Flow rates	from 0 - 150 gph
Four available pump models	Model 10, 20, 30 and 40
Pressure	up to 60 psi
Tube diameter	from 0.5 mm - 25.4 mm
Protection class	IP55
Drive options of single-phase variable speed, industrial 3-phase gear motors or OEM versions	
Optional leak detection	
Optional tube materials	

Drive options
The drives are available in three options:
B model: standard on-off, left-right functions and speed control
C model: B model functions + remotely controlled operation; 0-10 VDC or 4 - 20mA follower plus manual operation
L model: C model functions + programmable computer controls; RS232 /485 capability, Anti-Drop, Quick-Prime, 4 - 20 mA output signal and flow calibration function

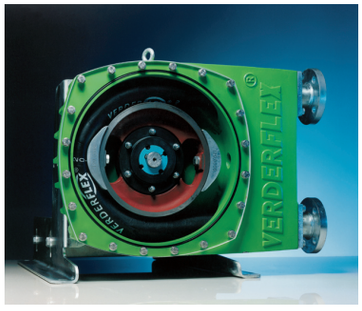
Industry	Application
Agriculture	Dosing of feed additives
	Spraying of insecticide
Biotechnology	Chromatography
	Circulate cell suspension in fermentation
	Dispensing agar into petri dishes
	Filtration
Chemical Industry	Caustic detergents
	Elutriation
	Flow injection analysis
	Infusion for tissue
	Injection metering
	Metering of pH acid/base
	Spectro photo metering
	Tank transfer
	Toxicology assays for salt solutions
Cleaning	Carpet sanitizers/cleaners
	Laundry chemicals dosing
Construction	Adhesives for cement
Environment	Contaminated ground water
	Flow injection analysis
	Sewage/sludge analysis
	Waste water sampling

Industry	Application
Environment cont.	Water salinity analyzers
Food	Bag-in-box cream dispensers
	Nutrition & prescriptive dosing
	Sauces
Pharmaceutical Industry	Cosmetic dispensing
	Dispensing of sterilized fluids
	Dissolution testers
	Fermentation control
	Harvesting cell media
	Nutrient supply for cultures
Printing industry	Dosing inks for lithographs
	Dosing of ink
Pulp and Paper	Pulp quality monitoring
Textile	Dosing of dyes
Waste Water Treatment	Lime dosing
	Ferric Chloride
	Polymer dosing
	Potassium Permangenate
Water treatment	Sodium Hypochlorite
	pH control of effluent
	Sodium Bisulfate
	Silicone water rinse
	Sodium Hydroxide
	Lime slurry

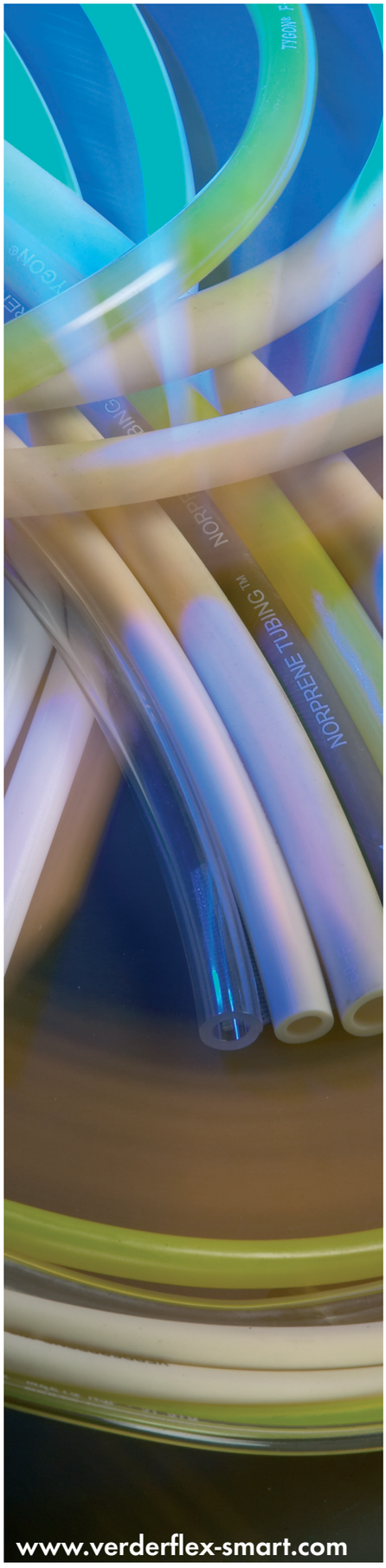
Whichever low-pressure tube pump you are looking for...
...the solution is VERDERFLEX SMART!

The Verderflex Pump Range

- Verderflex pumps have a flow rate from 2 l/hour (0.2 US Gallons per Hour) to 55m3/hour (390 US GPM)
- Discharge pressures up to 16 bar or 230 PSI
- Pumps can be supplied in either close coupled or long coupled (bare shaft) styles (only on the VF5 - VF80)
- System connections include DIN PN16, ANSI 150lb and JIS. EHEDG certified hygienic connection options include TriClamp, RJT, ILC, IDF, DIN 11851and DIN 11864, all with integral 316 Stainless Steel inserts



- Can be supplied with accessories including pulsation dampers, dosing controllers, even as complete dosing or transfer stations
- Clearly defined operating pump operation and cleaning protocols can be provided as part of the system design process



GPM PUMPS Inc.

P.O. Box 26850
Macon, Georgia 31221
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FAX (877) 471-3569
www.gpmpump.com

07-04-05-GPM-Rev.02

GPM PUMPS Inc.

PHONE (478) 471-7327
FAX (877) 471-FLOW (3569)
(877) GPM-FLOW (476-3569)

P.O. BOX 26850
MACON, GEORGIA 31221-6850
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SONOMA COUNTY - SCHELLVILLE STP
SECTION 11074 – PERISTALIC CHEMICAL METERING PUMPS

CHM1 Pumps:

CFP-101 and CFP-102
Qty. (2) – Verderflex Smart model C20 peristaltic tubing pumps, 1/60/115-230 VAC input, 0 to 240 RPM output, IP55 washdown enclosure, auto/off/manual control, 4-20 mA follower

Spare Pump
Qty. (1) – Verderflex Smart model C20 peristaltic tubing pumps, 1/60/115-230 VAC input, 0 to 240 RPM output, IP55 washdown enclosure, auto/off/manual control, 4-20 mA follower

Qty. (1) – Spare rotor assembly
Qty. (1) – 50’ roll of 4.8 MM ID x 1.6 MM WT Verderprene tubing
Qty. (1) – 20’ roll of 3.2 MM ID x 1.6 MM WT Verderprene tubing
Qty. (1) – 20’ roll of 6.4 MM ID x 1.6 MM WT Verderprene tubing

Budget price for all above including freight ----- $11,885.00

CHM2 Pumps:

CFP-103 and CFP-104
Qty. (2) – Verderflex Smart model C30 peristaltic tubing pumps, 1/60/115-230 VAC input, 0 to 240 RPM output, IP55 washdown enclosure, auto/off/manual control, 4-20 mA follower

Spare Pump
Qty. (1) – Verderflex Smart model C30 peristaltic tubing pumps, 1/60/115-230 VAC input, 0 to 240 RPM output, IP55 washdown enclosure, auto/off/manual control, 4-20 mA follower

Qty. (1) – Spare rotor assembly
Qty. (1) – 50’ roll of 15.9 MM ID x 3.2 MM WT Verderprene tubing
Qty. (1) – 20’ roll of 12.7 MM ID x 3.2 MM WT Verderprene tubing

Note: 15.9 MM ID x 3.2 MM WT tubing is largest size available for model C30 pump

Budget price for all above including freight ----- $17,080.00

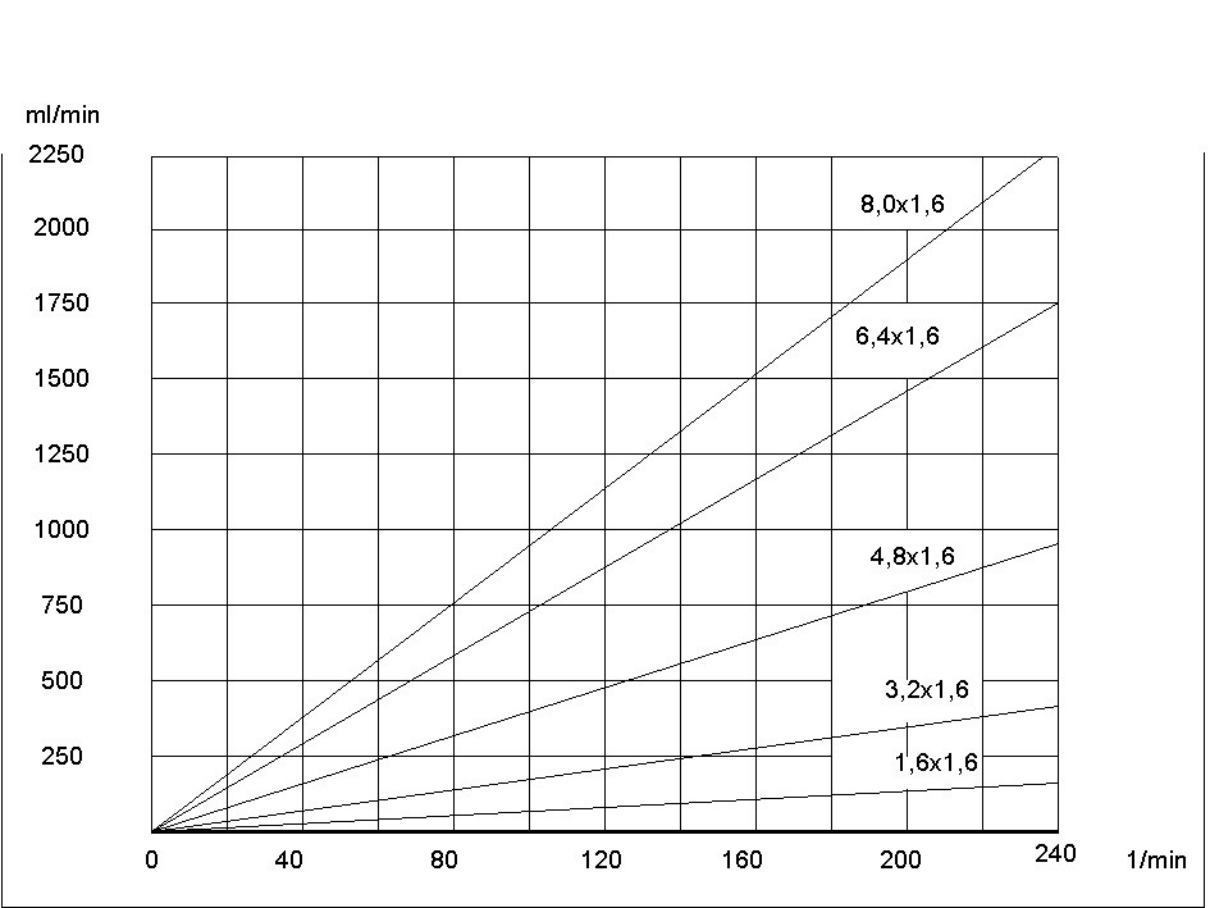
NOT INCLUDED IN PROPOSAL:

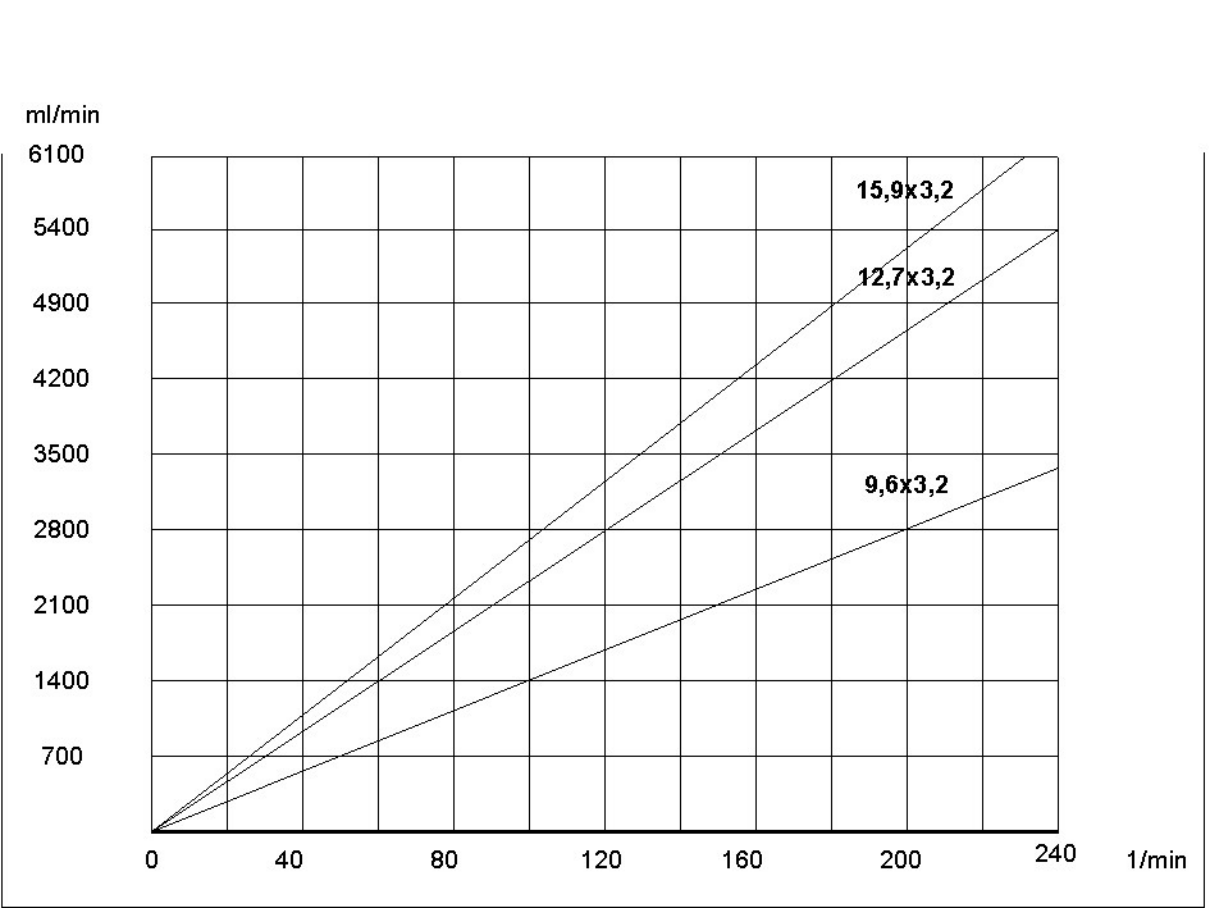
1. NEMA 12 local control panel with all controls and SCD
2. Any other item not specifically listed in proposal

Submittals: 4 weeks after receipt of formal purchase order

Delivery: 6 to 8 weeks after receipt of formal approval

Terms: Net 30-days


ml/min
2250
2000
1750
1500
1250
1000
750
500
250
8,0x1,6
6,4x1,6
4,8x1,6
3,2x1,6
1,6x1,6
0
40
80
120
160
200
240
1/min


ml/min
6100
5400
4900
4200
3500
2800
2100
1400
700
15,9x3,2
12,7x3,2
9,6x3,2
0
40
80
120
160
200
240
1/min

GPM
PUMPS Inc.

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(877) 476-3569

P.O. BOX 26940
MACON, GEORGIA 31221
www.gpmpump.com

VERDERFLEX SMART B, C AND L SERIES PERISTALTIC TUBING PUMP SPECIFICATION

Scope:

1. Provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install positive displacement peristaltic tubing pumps, self-contained variable speed drive, flexible extruded tubs, LCD keypad operators controls, compete and operational
2. Pumps shall be actuated as indicated on the pump schedule herein
3. Provide and proportion all spare parts for the pumps and duties specified
4. Provide all units with specified appurtenance and accessories as specified
5. Provide all necessary submittals, O&M manuals, electrical schematics as required for proper installation and operation

Quality Assurance:

Comply with specified with Chemical Feed General Requirement, and the additional requirements below.

1. American Society for Testing and Materials
2. National Electrical Code
3. Standards of National Electrical Manufacturers Association
4. Institute of Electrical and Electronic Engineers
5. American Gear Manufacturers Association
6. American National Standards Institute
7. ASTM A276, Stainless Steel Bars and Shapes
8. ASTM A320, Alloy Steel Bolting Materials for Low Temperature Service
9. ASTM B584, Copper Alloy Sand Castings for General Applications

A single supplier or manufacturer who, with the subcontractor, shall assume full responsibility for the completeness of the system shall supply all peristaltic pumps provided under this section.

Submittals:

Comply with all submittal requirements listed in Chemical feed Equipment General Requirements, and the additional requirements below.

GPM
PUMPS Inc.

PHONE (478) 471-7327
FAX (877) 471-3569
(877) 476-3569

P.O. BOX 26940
MACON, GEORGIA 31221
www.gpmpump.com

Shop Drawings: Submit for approval below:

1. Complete bill of materials
2. Complete dimensional drawings
3. Pump curves with duty points, operation and maintenance manuals, wiring diagrams
4. Detailed specification on all accessories and appurtenances
5. Specifications on all motors, variable speed drives
6. Listing of all spare parts with part number, description and quantities
7. Data to indicate that material provided are compatible with the chemicals pumped

Pump Duty Specifications:

Chemical:
Concentration:
Specific gravity:
Fluid temperature:
Ambient temperature:
Elevation above sea level:
Number of pumps:
Feed rate – minimum:
Feed rate – maximum:
Maximum discharge pressure:
Tube material:
Tube ID:
Power supplied:

Chemical:
Concentration:
Specific gravity:
Fluid temperature:
Ambient temperature:
Elevation above sea level:
Number of pumps:
Feed rate – minimum:

GPM
PUMPS Inc.

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Feed rate – maximum:
Maximum discharge pressure:
Tube material:
Tube ID:
Power supplied:

Chemical:
Concentration:
Specific gravity:
Fluid temperature:
Ambient temperature:
Elevation above sea level:
Number of pumps:
Feed rate – minimum:
Feed rate – maximum:
Maximum discharge pressure:
Tube material:
Tube ID:
Power supplied:

Details of Construction:

General:

Pumping assemblies, including pump and driver, to operate continuously within service conditions specified

Type:

1. Horizontal, positive displacement, peristaltic pump type with rollers that rotate on a fixed axis. Pumps that incorporate spring loaded roller shall not be considered acceptable
2. Pumps shall incorporate an integral brushless DC motor, SCR drive and operators keypad, all items shall be enclosed in a common IP55 water resistant rated enclosure
3. Pump shall be capable of running continuously in either direction

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4. Pump head shall incorporate integral bearings for full support of shaft. Pumps without integral bearings shall not be considered acceptable.
5. Pumps shall be capable of running dry with damage to pump or tubing
6. Metering accuracy of +/- 5%
7. Repeatability of +/- 1%
8. Valveless and glandless with no dynamic shaft seals in contact with the pumped product
9. One spare 50" roll of tubing of the specified material and size for each set of common size pumps

Pump Features and Performance:

Materials of Construction:

Part	Smart 10/20	Smart 30/40
Tube Saddle	Polyacetal	Polyacetal / Aluminium
Roller Plate	Polyacetal	316 stainless steel
Rollers	Polyacetal	316 stainless steel
Pins between the rollers	Polyacetal	Polyacetal
Base underneath the rollers	Polyacetal	Polyacetal
Backplate	Polyacetal	Polyacetal
Front cover	Polycarbonate	Polycarbonate
Drive shaft	316 stainless steel	316 stainless steel
Screws and bolts	316 stainless steel	316 stainless steel
Nuts to hold front cover	Aluminum	Aluminum
Bearing	Various materials	Various materials
V-grooved plates	316 stainless steel	316 stainless steel
Casing	Coated aluminum	Coated aluminum
Supports	Polyacetal / 316 stainless	Polyacetal / 316 stainless

Pumphead shall incorporate the following:

1. Pumphead shall incorporate a tube saddle that allows tubing to be changed without the use of hand tools, and tube saddle shall be

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interlocked with drive to safely shutdown pump if tube saddle is inadvertently removed while pump is running
2. Pump head shall incorporate integral bearings for full support of shaft. Pumps without integral bearings shall not be considered acceptable.
3. Self adjusting tube clamps eliminating need for manual adjustment
4. 3-rollers for compression of tubing that rotate on a fixed axis eliminating spring loaded rollers

Drive:

1. Units shall have an illuminated keypad for operators functions
2. Shall be user selectable for 1/50-60/115 or 1/50-60/230 VAC input
3. Shall have maximum speed of 240 RPM
4. Pumps incorporating manual adjustment of speed shall have a 40:1 infinitely variable speed turndown capability, and pumps that have a 4-20 mA, 0-10 VDC or RS232/485 interface input shall have a 100:1 infinitely variable speed turndown capability
5. Following operators controls:
   i. On/off
   ii. Start/Stop
   iii. Forward/reverse
   iv. Speed adjustment
   v. Max speed
   vi. Menu option selector
   vii. Enter selected option
6. Brushless DC motor and integral speed reducer

Spare Parts:

1. One spare 50” roll of tubing of the specified material and size for each set of common size pumps
2. One pumphead for each set of common size pumps

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Manufacturers Field Services:

1. The manufacturer shall check and approve installation in accordance with factory recommended procedures
2. The manufacturer shall run the pumps in the presence of the contractor and shall verify the equipment conforms to the specified conditions
3. Manufacturer shall provide complete operator training in accordance with the specifications

Manufacturer:

1. Verderflex Smart B, C or L range
2. Cole-Parmer Instrument Company
3. Or engineer approved equal

VERDERFLEX® SMART

Manual
VERDERFLEX Smart
B-, C- and L-series

VERDER
Solutions in Pumping Technology

Table of contents

1. Notes for a secure operation

Pictograph explanation (icons)

Safety-relevant chapters and sections in the instruction manual are indicated by this icon. If attached to the device, this icon refers to special observance of the instruction manual.

Furthermore, this is a note in the instruction manual about the optimal use of the device.

1.1 General safety notes

For queries and spare parts orders, include the product label information.
For the labour to and with this device, written instructions in a legible form and in the language of the employee (Germany: UVV VBG 1' 7(2)) are to be created in compliance with this instruction manual and based on the work to be done by the user.

Observe the instruction manual and store it close to the device.

The safety standards in relation to the protection of people, the environment and the good of the process for these devices are very much dependent upon the actions of the person using the devices.
Read this instruction manual carefully before you start using the devices in order to avoid errors and conditional damage. The device must only be operated by approved personnel. The power supply line cable and plug are to be checked for damages before using the product. If damages are evident, you must not connect the device to the power supply. The specified voltage (rated voltage) must match that of the available power supply working voltage. Repairs to the electro equipment may only be conducted by qualified personnel under secure conditions. (Pump switched off and disconnected from mains)
Only permitted accessories and approved original replacement parts may be used. The use of other parts can lead to unknown risks and should be avoided at all times. The efficiency and safety of the device is only guaranteed when the required checks, maintenance, and repairs are carried out by a VERDER Service or by personnel authorized by VERDER.

If dangerous or unknown materials have been used with the pump, the pump should be emptied and cleaned, and (if possible) the tube should be removed from the pump before any maintenance and repairs are conducted. Read the safety regulations specified in this manual carefully.

When using dangerous materials, the correct tube - with an appropriate chemical resistance – is to be selected.

1.2 Installation, usage and operation

The device must be turned off when inserting the tubes or while cleaning. The pump must not be switched on and operating! Revolving pump parts may cause injury. Do not place any body parts in the rotating pump hardware.
Both ports suitable connectors between pipes and the tube must be used. A correct tube or tube diameter must be selected. A too a small diameter is not recommended because it may cause an excessive pressure of pressure on the pump's discharge side.

1.3 Maintenance und Repair

Warning:

Maintenance and repair work on VERDER flexible tube pumps may only be conducted by experienced and authorized personnel.
If dangerous or unknown materials are used with the pump, the pump is to be emptied and cleaned before maintenance and repairs.
When placing dangerous or unknown materials into the pump, it is mandatory that you wear protective gear (protective glasses, protective gloves, etc.).
For flexible tube pumps, you should always consider the tube's life time and ensure that you change the tubes by the end of the suitable period of operation. Breakage of the tube can result in excessive wear and tear.

Danger:

The pump encasement contains a dangerous level of voltage!
Before you open the pump casing, the electricity supply for the drive train must be disconnected.
During the maintenance and repair service, you must ensure that no unauthorized personnel can turn on the flexible tube pump.
Only return/send the cleaned pump to Verder Germany or your local distributor.

2. Assembly and installation

2.1 Guarantee

All VERDER pumps are covered by a two-year guarantee commencing from the date of delivery. This covers defects in manufacturing or material quality during normal use (renting out is not permitted). The guarantee does not cover damage as a result of wear, or any damage and/or errors possibly caused by incorrect use. Parts identified by VERDER as defective in quality will be repaired or replaced.

2.2 Limitation of liability

In accordance with authorised additions to applicable regulations, VERDER rejects all liability for secondary damage. In any case the liability of VERDER is limited and does not exceed the unit's original price.

2.3 Limitation of guarantee

VERDER has made all efforts to illustrate and describe the products as well as possible by way of this brochure. These descriptions serve only for product selection and represent no guarantee that the products are suitable for specific applications, can be combined with one another, or that the illustrations shown necessarily reflect actual units.

2.4 Product applications

Many regions, federal states and areas have standards and regulations which cover the sale, construction, installation and/or use of products for specified purposes and which may deviate from those of other areas. Although VERDER attempts to ensure that all products fulfil all such standards, such fulfilment cannot be guaranteed. In addition we assume no liability regarding the use, installation and operation of VERDER products. Before purchasing c.q. using these units, please obtain information concerning the relevant local regulations.

2.5 Placement

If the device was subjected to high temperature differences during transport, an adjustment to the room temperature must take place before the start-up of the device.
The ambient temperature must be between 0°C and 35°C.

2.6 Power supply connections

Attention:

The device is fitted with a flexible power supply line. The plug connects the device to the main power supply.
The connection cord and plug must be checked for damages before being used. If the products are damaged, the device must not be connected to the power supply.
The voltage specified on the product label (rated voltage) must correspond to the power supply nominal voltage.

VERDERFLEX® SMART	VERDER LabTec GmbH Co. KG 42781 Haan 0800/8373373 www.verder.de	
○ Typ	115/230[V] 50/60[Hz]	CE ○
Ser.Nr.	P [VA] IP55	

In cases in which other mains plugs are needed the cable can be exchanged by an expert.

1. Main power
2. 8-pin plug for external control (refer to page 25)
3. 5-pin plug for external START/STOP (refer to page 26)
4. Power connection
5. Switch 115/230V
6. Fuse

3. The drives

3.1 Description

The VERDERFLEX SMART Drives are designed with the most up-to-date technology. They are suitable for both industrial applications and applications in pilot plants or laboratories. For this reason, all drives specified to protection class IP55. The vertical manner of construction is based on ergonomic technology. As such, the display positioned on the upper part of the pump casing can be read from any direction without other elements blocking the user's view. The large buttons can also be easily operated even when wearing gloves. The pump head is arranged in such a way that the tube is always inserted in-line and without bends.

3.2 Variants

To cover the entire spectrum of performance, only two motor sizes are required. Each of these drives can be delivered in three versions:

B is the basic version for simple tasks. This pump has the basic functions: on/off, right/left motion and pump speed. It may be operated by hand or via a foot switch.

C offers extra control options: In addition to the basic functions, the pump can also be operated via external signals such as 0-10V or 4-20mA.

L is the pump for those with the greatest of demands. In addition to the C functionalities it also has output calibration capabilities. You can also program the time or dosage programs, which make it possible to carry out frequently tasks comfortably and correctly.

4. The pump head

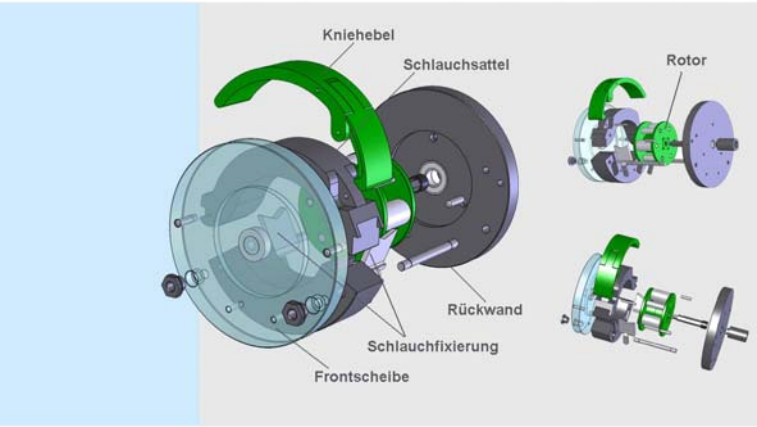
4.1 Description of the pump head

The tube can be placed into the pump head in a few seconds. The tube saddle status detection prevents the pump from being started without the rotation when the tube saddle in place.

The pump head fundamentally consists of four parts:

- The rotor with the wheels which are responsible for the peristaltic action of the pump
- The transparent front cover, which allows to check the pump operation and the direction of rotation
- The encasement which houses the self-fixing tube clamps. These can be adjusted to any permitted tube geometry and they stop the tube from sliding to the discharge side. On the pressure side, they are constructed such that an elongation of the tube can be accommodated and thus, the tube always remains fit tightly in the encasement.
- The EasyFix tube saddle. This constitutes the counter-encampment for the tube and can be removed with a knee lever clamp in just a few seconds. The tube saddle can be unlocked and removed from the encampment with one hand.

4.2 Assembly of the pump head



4.3 Changing the tube


Inserting the tube


Mounting the saddle


Locking

To change the tube, the tube saddle is opened and the tube is placed onto the rotor. The tube saddle is mounted and locked in the dowel of the encasement with the notches found at the end. The self-centring tube clamps ensure that the tube is automatically centred.

4.4 Tube saddle status detection SSD

In order to get the maximum safety for the user, all pump heads are equipped with a sensor which detects whether the tube saddle is in place or not. If the tube saddle is no in place, the drive will not start, and a failure status is shown in the display.
By pressing the ENTER-button the error will be erased.
If the tube saddle is removed during the operation, the drive is stopped immediately and an adequate failure is shown in the display. This applies also if any tube saddle is removed on a multichannel head.
By pressing the ENTER-button the error will be erased.

Attention:

If one or more heads are extended afterwards you have to take care that these heads will be connected with the electronic. These works should only do skilled persons. We recommend in these case to send the pump back to the next distributor who will take care of the necessary steps.

There is acute injury danger, if a pump is operated without SSD, then. Moreover, the general operating license goes out and the operator is liable for all damages caused by it.

4.5 Notes of operation

Recommendations for the operation of VERDERFLEX Smart:

I. To avoid a loss of flow, keep the suction line and pressure line as short as possible. Rigid suction and pressure lines should be straight and without any dead zones and/ or bends.

II. For the longest tube life possible, work with a lower speed and with large inner tube diameters.

III. Pumping or dosing of viscous items is best at low a speed. A wall thickness of 2.4 mm improves the suction of viscous liquids.

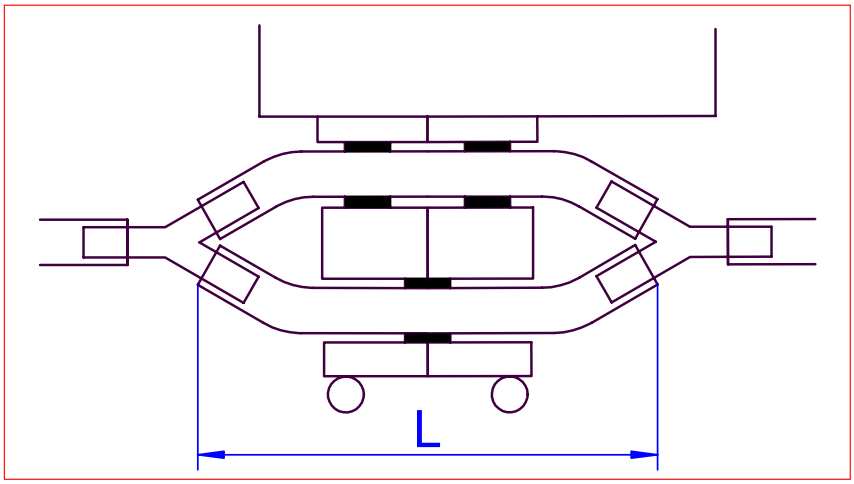
IV. For an unknown chemical compatibility of the tube, it is recommended to conduct a test in advance. For this, weigh a piece of the tube (ca. 2 cm) and then place it in the liquid. After approximately one day, test the weight of this sample tubing. Should there only be a slight change in the weight (± 10%), a test can then be made in the pump.

4.6 Assembly instructions for multiple channel heads

The Smart pump heads can, at any time, be upgraded to up to four channels. In order to install more pump heads, first remove the existing pump head: undo the locking nuts and then remove all parts, including the Allen hexkey and the fixing pins. Then insert the new longer Allen hexkey and the new fixing pins. Slide the pump heads onto the drive shaft, separating the pump heads by Perspex dividers. Finally insert the existing Perspex front cover and secure the assembly with the locking nuts.

4.7 Activation of the double channel pump head (Low pulsation Head)

The double channel pump head largely reduces pulsation as the pulses from each channel partly cancel each other.
For this variant, when mounting the rotors, you must make sure that the rollers of both rotors are installed staggered; the roller from one rotor is placed exactly into the gap between the rollers of the other rotor as shown in the picture below.



Sketch of the pump head from above (without the tube saddle):

In order to split and then to merge the flow from both channels, two Y pieces must be inserted. Both tubes should be the same length.

5. Instruction manual B, C, L (10 – 40)

The use of flexible tube pumps to pump liquids and gases has considerable advantages: it is the only way to pump fluids without immediate contact to moving parts. For every product, a new tube can be used hence avoiding lengthy cleaning of the pump.

The use of flexible tube pumps allows the in-situ sterilization of tubes, pipes and tanks and thus, a sterile operation. An additional advantage are low shear forces. The smooth peristaltic action avoids any sharp corners or bends which may damage sensitive materials such as yeast or polymers, as frequently happens in the case of gear type pumps, eccentric rotor pumps, or diaphragm pumps.

Before putting the pump in service it has to be calibrated (see 9.5).

5.1 Device description

The VERDERFLEX SMART pump is a peristaltic pump designed for applications in laboratories and industrial applications.
The tube can be inserted or changed within seconds.
The drive unit offer both constant high speed performance as well as an exact control system; a consistent pump performance is guaranteed.

The pumps speed of VERDERFLEX SMART pumps is continuously adjustable.

An illuminated LC display provides you with information on the operating condition and efficiency.

The parameters are set using a large keypad.

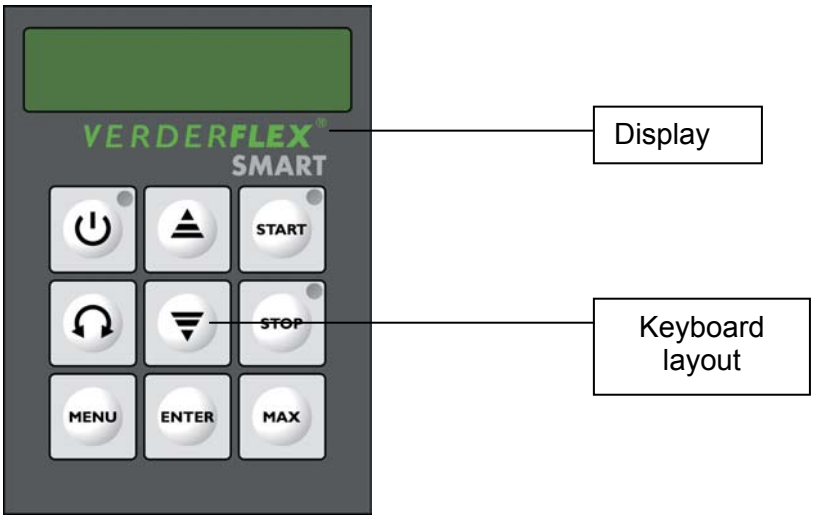
A number of menus provide a way to calibrate the flow, set user specific dosing functions and the change between internal and external controls.

The direction of rotation can be selected. The flow characteristics are the same in both directions.

An overload alarm indicates too high a power consumption of the motor and the pump will shut down immediately.

6. Control panel

6.1 Control panel



On-/Off-button

Button used for changing the direction of rotation

Menu button for the selection of the calibration or menu functions

This button increases the pump speed

This button decreases the pump speed

By pressing the Start button. The pump or the respective program is started.

The motor is stopped immediately and cancels preset programs.

When this button is pressed, the pump runs at the maximum speed (quick suction). When the button is released, the previously set speed is in effect.

6.2 Technical data

Model Smart	Speed 1/min	Control range	External signals	Weight Kg	Power VA	IP	Power [V]	Freq [HZ]
B10	240	40:1	Manual	12,5	120	55	115/230	50/60
B20	240	40:1	Manual	12,5	120	55	115/230	50/60
C10	240	100:1	4-20 mA;0-10V	12,5	120	55	115/230	50/60
C20	240	100:1	4-20 mA;0-10V	12,5	120	55	115/230	50/60
L10	240	100:1	4-20 mA;0-10; RS 232	12,5	120	55	115/230	50/60
L20	240	100:1	4-20 mA;0-10; RS 232	12,5	120	55	115/230	50/60
B30	240	40:1	Manual	22	285	55	115/230	50/60
B40	240	40:1	Manual	22	285	55	115/230	50/60
C30	240	100:1	4-20 mA;0-10V	22	285	55	115/230	50/60
C40	240	100:1	4-20 mA;0-10V	22	285	55	115/230	50/60
L30	240	100:1	4-20 mA;0-10; RS 232	22	285	55	115/230	50/60
L40	240	100:1	4-20 mA;0-10; RS 232	22	285	55	115/230	50/60

7. Menu guide B-series

7.1 Main menu

When scrolling the menu, press the **MENU**-button. The program to be selected is always displayed on the lowest line. The program is then selected pressing the **ENTER**-button.

```
1 MANUALLY
SW-VERSION 1.00
```

```
2 SERVICE
SW-VERSION 1.00
```

SER: NO
SW-VERSION
DUTY TOTAL
DUTY SERV
BACK TO TOP

7.2 Menu 1 Manual operation

```
1 MANUALLY……>
SW-VERSION 1.00
```


```
1 MANUALLY 000%
SW-VERSION 1.00
```

Program for the manual speed/volume change

To change the value press the ▼▲ buttons.

The adjusted value is confirmed.

Changes the direction of the pump.

The program is started.

By pressing the **STOP**-button the program stopped.

7.3 Menu 2 Service

2 SERVICE SW-VERSION 1.00	Informationen about the pump
	
SER. NO. SW-VERSION 1.00	Serial number of the pump
	
SW-VERSION 1.00 SW-VERSION 1.00	Software version of the pump
	
DUTY TOTAL 0 SW-VERSION 1.00	Operating hours
	
DUTY SERV 2000 SW-VERSION 1.00	Operating hours until the next inspection
	
BACK TO TOP SW-VERSION 1.00	
	

8. Menu guide C-series

8.1 Main menu

When scrolling the menu, press the **MENU**-button. The program to be selected is always displayed on the lowest line. The program is then selected pressing the **ENTER**-button.

```
1 MANUALLY      <
SW-VERSION 1.00
```

```
2 SETUP
SW-VERSION 1.00
```

AUTO-START
FRONT PANEL
EXT 4-20
EXT 0-10
BACK TO TOP

```
3 SERVICE
SW-VERSION 1.00
```

SER: NO
SW-VERSION
DUTY TOTAL
DUTY SERV
BACK TO TOP

8.2 Menu 1 Manual operation

```
1 MANUALLY……>
SW-VERSION 1.00
```


```
      099 RPM
SW-VERSION 1.00
```

Program for the manual speed/volume change

To change the value press ▼▲ buttons.

The adjusted value is confirmed.

Changes the direction of the pump.

The program is started.

By pressing the **STOP**-button the program is stopped.

8.3 Menu 2 Setup of the basic settings

2 SETUP SW-VERSION 1.00	In this menu, different basic settings are set for the pump.
	
AUTO-START : OFF SW-VERSION 1.00	
	Using the ▲▼ buttons, you can switch between ON and OFF. If you choose ON the pump will be started automatically after interuption of the power.
	
FRONT PANEL ? Y SW-VERSION 1.00	Whit this function the keyboard will be disabled, so that the pump can be not be turned off accidental. The ▲▼ buttons, ON/OFF, STOP and MAX are not active. By pressing the ▲▼ buttons for 3 seconds the keyboard will be enabled.
	You can use the ▲▼ buttons to switch between Y = Yes and N = No.
	
EXT 4-20 mA ? N SW-VERSION 1.00	Setting the external control
	You can use the ▲▼ buttons to switch between Y = Yes and N = No.
	

EXT 0-10 V ? N SW-VERSION 1.00	Setting the external control
	You can use the ▲▼ buttons to switch between Y = Yes and N = No.
	
BACK TO TOP SW-VERSION 1.00	
	

8.4 Menu 3 Service

3 SERVICE SW-VERSION 1.00	Informationen about the pump
	
SER. NO. SW-VERSION 1.00	Serial number of the pump
	
SW-VERSION 1.00 SW-VERSION 1.00	Software version of the pump
	
DUTY TOTAL 0 SW-VERSION 1.00	Operating hours
	
DUTY SERV 2000 SW-VERSION 1.00	Operating hours until the next inspection
	
BACK TO TOP SW-VERSION 1.00	
	

9. Menu guide L-series

9.1 Main menu

When scrolling the menu, press the **MENU**-button. The program to be selected is always displayed on the lowest line. The program is then selected pressing the **ENTER**-button.

- SMART MENUE -
1 PROG-MODE

1.1 MANUALLY
1.2 TIME-MODE
1.3 DOSE-MODE
1.4 BACK TO TOP

- SMART MENUE -
2 CAL-MODE

SPEED
START
STOP
VOL
BACK TO TOP

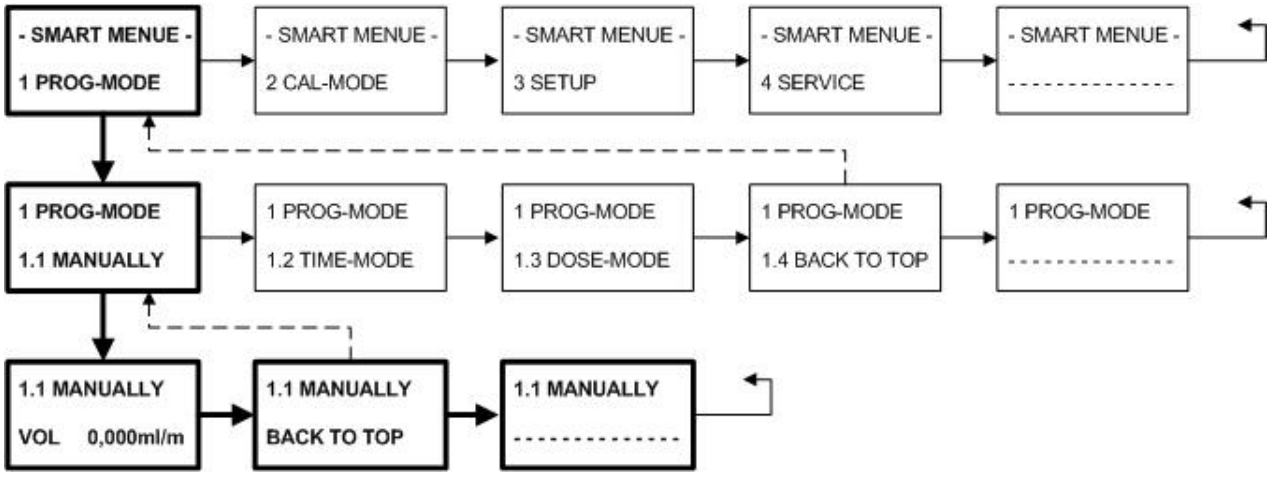
- SMART MENUE -
3 SETUP

ANTI-DROP
AUTO-START
RAMP-UP
RAMP-DOWN
FRONT PANEL
EXT 4-20
EXT 0-10
REMOTE RS232
KEYBOARD EXT
BACK TO TOP

- SMART MENUE -
4 SERVICE

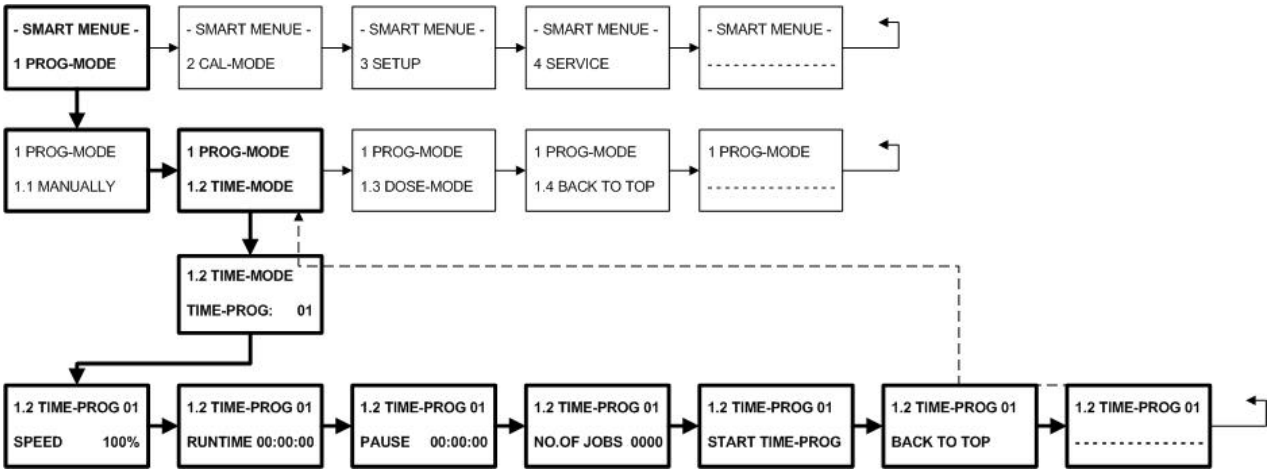
SER: NO
SW-VERSION
DUTY TOTAL
DUTY SERV
BACK TO TOP

9.2 Menu 1.1 Manual operation



1 PROG-MODE 1.1 MANUALLY	
ENTER	
1.1 MANUALLY < VOL 000.000 ml/m	Program for the manual speed/volume change
	Changes the direction of the pump
ENTER	Change the volume: The cursor changes to the single digits. To change the volume press the ▼▲ buttons.
MENU	By multiple pressing of the **MENU**-button, the cursor switches into tens, hundreds etc. decimal place.
ENTER	The adjusted value is confirmed
START	The program is started
STOP	By pressing the **STOP**-button the program is stopped.

9.3 Menu 1.2 Time program



1 PROG-MODE 1.2 TIME-MODE	
ENTER	
1.2 TIME-MODE TIME-PROG : 01	
ENTER	Using the ▼▲ buttons, set up to 10 programs in advance which are called up pressing **START**.
ENTER	1.2 TIME-MODE < SPEED 000% — Setting the speed
↻	Changes the direction of the pump
ENTER	The cursor moves to the percentage speed code which can be changed using the ▼▲ buttons.
ENTER	1.2 TIME-MODE < RUNTIME 00:00:00 — Setting the time
ENTER	The cursor moves to the code for hours. By pressing the **MENU**-button, the cursor is moved to minutes or seconds, which can be changed by pressing the ▼▲ buttons.

1.2 TIME-MODE <
PAUSE 00:00:00

Setting the pause-time

The cursor moves to the code for hours. By pressing the **MENU**-button, the cursor is moved to minutes or seconds, which can be changed by pressing the ▼▲ buttons.

1.2 TIME-MODE <
NO. OF JOBS 0000

Number of jobs

The cursor moves to the single digits. By pressing the **MENU**-button the thousands, hundreds and tens digits are adjusted, which can be changed by pressing the ▼▲ buttons.
If you choose 0000 the drop will be endless.

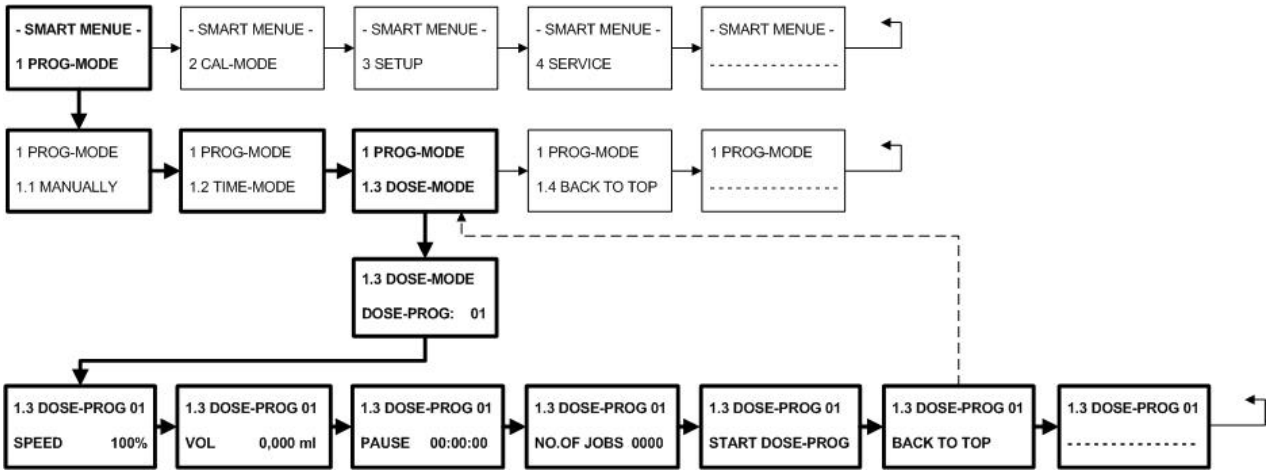
1.2 TIME-MODE <
PRESS START

The program is started

or

1.2 TIME-MODE <
BACK TO TOP

9.4 Menu 1.3 Dosage program



1 PROG-MODE 1.3 DOSE-MODE	
ENTER	
1.3 DOSE-MODE DOSE-PROG : 01	
ENTER	Using the buttons ▲▼, set up to 10 programs in advance which are called up pressing **START**.
ENTER	1.3 DOSE 01 < SPEED 000% — Setting the speed
	Changes the direction of the pump
ENTER	The cursor moves to the percentage speed code which can be changed using the ▲▼ buttons.
ENTER	1.3 DOSE 01 < VOL 0.000 ml — Setting the volume
ENTER	The cursor moves to the single digit of the volume display which can be changed with the ▲▼ buttons, by pressing the **MENU**-button, additional digits are started up.


```
1.3 DOSE  01      <
PAUSE     00:00:00
```

Setting the pause-time

The cursor moves to the code for hours. By pressing the **MENU**-button, the cursor moves to minutes or seconds, which can be changed by pressing the ▼▲ buttons.


```
1.3 DOSE  01      <
NO. OF JOBS  0000
```

The cursor moves to the single digit. By pressing the **MENU**-button the thousands, hundreds and tens digits are adjusted, which can be changed by pressing the ▼▲ buttons.
If you choose 0000 the drop will be endless.

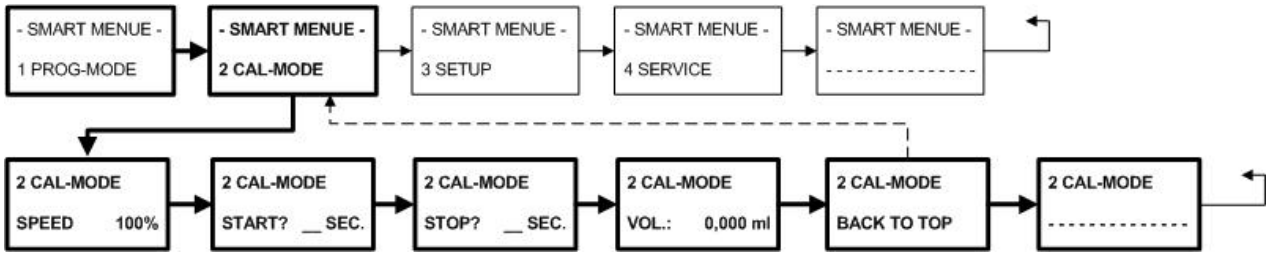

```
1.3 DOSE  01      <
PRESS START
```

The program is started

or

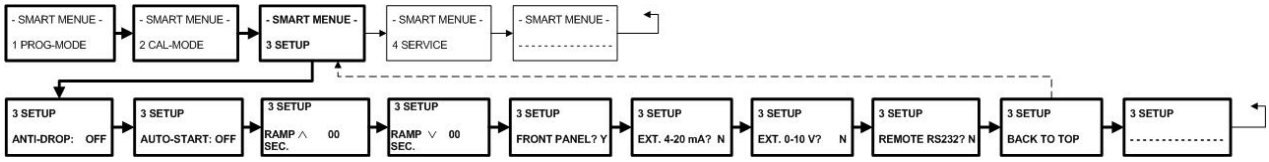

```
1.3 DOSE  01      <
BACK TO TOP
```

9.5 Menu 2 Calibration of the pump



- SMART MENUE - 2 CAL-MODE		In this menu, the facilitation amount is determined with a specified tube for a predefined speed within a predetermined period of time.
ENTER		
2 CAL-MODE < SPEED 100%		
		Changes the direction of the pump
ENTER		The cursor moves to the percentage speed code which can be changed using the ▲▼ buttons.
ENTER	2 CAL-MODE < START ? 010 SEC	Setting the time
ENTER		The cursor moves to the seconds display which can be adjusted using the ▲▼ buttons.
START	2 CAL-MODE < STOP ? 010 SEC	The pump begins to run. Within this period of time, the pump can be stopped manually.
ENTER	2 CAL-MODE < VOL 00000.000 ml	The measured volume is entered here. The cursor moves to the digit. By pressing the **MENU**-button, the other digits can be changed with the ▲▼ buttons.
ENTER	2 CAL-MODE < BACK TO TOP	

9.6 Menu 3 Setup of the basic settings

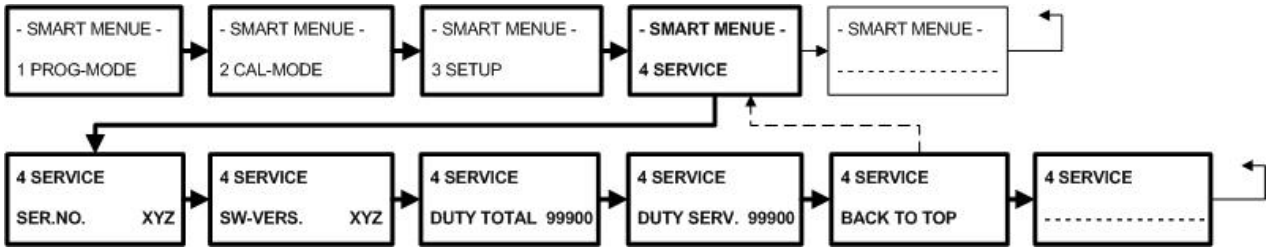


- SMART MENUE - 3 SETUP	In this menu, different basic settings are set for the pump.
ENTER	
3 SETUP ANTI DROP : 0.0	Setting the prevention of dripping. The pump returns according to the dosage process to the established amount of revolutions.
ENTER	The cursor moves to the setting for entire revolutions. By pressing the **MENU**-button, 1/10 revolutions can be adjusted, which can be changed by pressing the ▼▲ buttons.
ENTER	
3 SETUP AUTO-START : OFF	
ENTER	Using the ▲▼ buttons, you can switch between ON and OFF. If you choose ON the pump will be started automatically after interuption of the power.
ENTER	
3 SETUP RAMP-UP 00 SEC	Set the time in which the pump ramp up start up from the stationary to the set speed.
ENTER	You can use the ▲▼ buttons to set between 1-30 seconds.
ENTER	

3 SETUP RAMP-DOWN 00 SEC	Set the time in which the pump should ramp down all the way from the set speed until complete stop.
	You can use the ▲▼ buttons to set the time to between 1-30 seconds.
	
3 SETUP FRONT PANEL ? Y	With this function the keyboard will be disabled, so that the pump can not be turned off accidental. The ▲▼ buttons, ON/OFF, STOP and MAX are not active. By pressing the ▲▼ buttons for 3 seconds the keyboard will be enabled.
	You can use the ▲▼ buttons to switch between Y= Yes and N= No
	
3 SETUP EXT 4-20 mA ? N	Setting the external control
	You can use the ▲▼ buttons to switch between Y= Yes and N= No
	
3 SETUP EXT 0-10 V ? N	Setting the external control
	You can use the ▲▼ buttons to switch between Y= Yes and N= No
	

3 SETUP REMOTE RS232 ? N	Setting the external control
	You can use the ▲▼ buttons to switch between Y= Yes and N= No
	
3 SETUP KEYBOARD EXT.? N	Setting the foot-operated switch
	You can use the ▲▼ buttons to switch between Y= Yes and N= No
	
3 SETUP BACK TO TOP	

9.7 Menu 4 Service



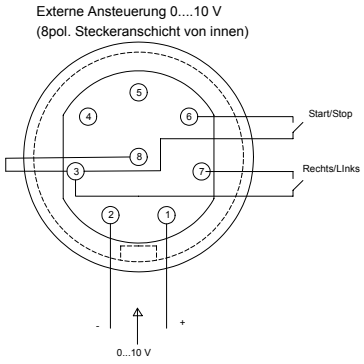
- SMART MENUE - 4 SERVICE	Information about the pump
ENTER	
4 SERVICE SER. NO.	Serial number of the pump
MENU	
4 SERVICE SW-VERSION 1.00	Software version of the pump
MENU	
4 SERVICE DUTY TOTAL 000	Operating hours
MENU	
4 SERVICE DUTY SERV 2000	Operating hours until the next inspection

10. External controls

Suitable IP66 connectors are available.

10.1 Connector 1 (8-pin) (only for C and L-series!)

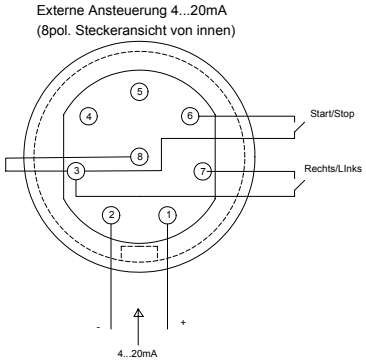
0-10 Volt



Activation
External control signals:
SMART MENUE
1.
2.
3. SETUP
EXT. 0 – 10V adjust with ▼▲ activate using Y”

Pin 1	0 - 10V
Pin 2	analogue ground
Pin 3	digital ground
Pin 4	RXD (RS232)
Pin 5	TXD (RS232)
Pin 6	Start-/Stop-signal (against digital ground)
Pin 7	Right-/Left-signal (against digital ground)
Pin 8	Ground

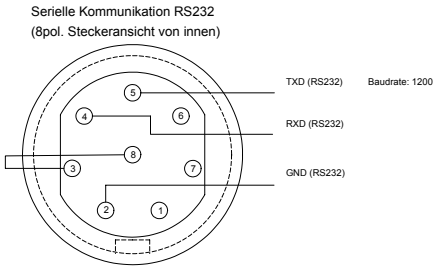
4-20 mA



Activation
External Control Signals:
SMART MENUE
1.
2.
3. SETUP
EXT. 4 – 20mA using ▼▲ activate with Y“

Pin 1	4 - 20mA
Pin 2	analogue ground
Pin 3	digital ground
Pin 4	RXD (RS232)
Pin 5	TXD (RS232)
Pin 6	Start-/Stop-signal (against digital ground)
Pin 7	Right-/Left-signal (against digital ground)
Pin 8	Ground

RS 232



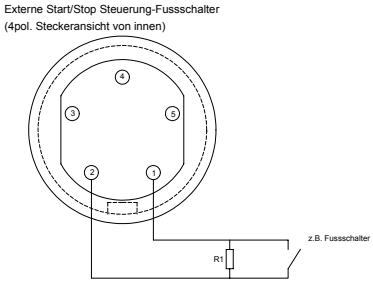
Activation
External Control Signals:
SMART MENUE
1.
2.
3. SETUP
REMOTE RS232 using ▼▲ activate with Y”

Pin 1 4 - 20mA (0…10V)
Pin 2 analogue ground
Pin 3 digital ground
Pin 4 RXD (RS232)
Pin 5 TXD (RS232)
Pin 6 Start-/Stop-signal (against digital ground)
Pin 7 Right-/Left-signal (against digital ground)
Pin 8 Ground

Pin No. 5-pl. connector	Assignment pump	Pin No. 9-pl. Sub-D connector	Pin No. 25-pl. Sub-D connector	Assignment computer
5	TXD	2	3	RXD
4	RXD	3	2	TXD
2	GRN	5	7	GND

10.2 Connector 2 (5-pin) (only for C and L-series!)

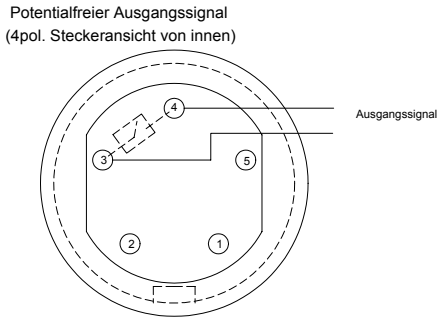
External Start/Stop-Signals



Activation
External Start-/Stop-Signals:
SMART MENUE
1.
2.
3. SETUP
KEYBOARD EXT. using ▼▲ activate with Y”

Pin 1	4V Output (+/-20%; 10mA)
Pin 2	Start/Stop-Input
Pin 3	Relay
Pin 4	Relay
R1	4k7 resistor

10.3 Output-signal (only for C and L-series!)



Pump gets Start-signal – Contact between Pin3 and Pin4 **OPEN**

Pump gets Stop-signal – Contact between Pin3 and Pin4 **CLOSED**

Pin 1	5V Output (+/-20%; 10 mA)
Pin 2	Start/Stop-Input
Pin 3	Relay
Pin 4	Relay
Pin 5	Ground

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VERDERFLEX®

Pumping solutions for the water and wastewater industries

GPM PUMPS Inc.

VERDER

Solutions in Pumping Technology

The Water Industry

Globally, both clean and wastewater treatment facilities have common equipment requirements.

They should:

- Perform as expected
- Have a low cost of ownership
- Be reliable, easy to maintain without specialized maintenance skills
- Resist everyday "real world" experiences such as plugging and failure

In addition, when treating a liquid stream, pumps should:

- Provide repeatable flow rates especially when dosing
- Have high levels of plant availability
- Resist abrasive wear
- Be controllable via plant control systems
- Be both easy to maintain and to require infrequent attention
- Not affect overall levels of plant performance
- Not cause conflicts with regulatory authorities

Lime Dosing and Mixing in pH and Odor Remediation Treatments

Lime, slurry and hydrated lime is one of a group of wastewater and water treatment chemicals that are used to adjust the pH of wastewater and water. Other chemicals include Ferric salts, Caustic Soda, Aluminium Sulphate, Ferrous Sulphide and Powder Activated Carbon (PAC). Many of these have common properties that make peristaltic pumps an ideal dosing solution because:

- They are particularly abrasive, creating continual wear problems for progressive cavity pumps leading to ongoing high stator replacement costs and frequent maintenance downtime
- Lime is relatively highly viscous, usually too viscous for diaphragm pumps, causing them to clog up resulting in continual maintenance requirements
- Verderflex pumps have a linear flow-speed characteristic, ideal for feedback control systems, allowing precise control of the chemicals being dosed, minimizing chemical usage
- Verderflex pumps have a smooth liquid passage, there are no opportunities for product to settle and the peristaltic action keeps product in suspension rather than allowing settlement
- Product may be mixed on site - solids in the liquid stream are not a problem for Verderflex pumps
- Verderflex's seal-free design eliminates leaks and the consequent risk of workplace contamination. In addition, all Verderflex pumps can run dry without damage to the pump

Sodium Hypochlorite Dosing

Sodium Hypochlorite (Hypo) has outstanding disinfection properties and dosing with locally generated solution is one of the primary methods of drinking water disinfection and odor control solutions. It is also a challenging product for a pump:

- When being pumped, Hypo tends to gas causing diaphragm dosing pumps to vapor lock and the liquid stream is not treated
- Degassing kits, at best, allow such pumps to slowly recover dosing performance jeopardizing consistent flow output
- Verderflex pumps pump both gas and liquid and ensure all the liquid stream receives a consistent dose
- Verderflex's Hypalon® hoses will withstand up to 17% solutions allowing them to be used with both low strength and high strength Hypo generation systems

Hypalon® is a registered trademark of DuPont Dow Elastomers

Dosing Polymers and Ferric in Coagulation Processes

"Ferric" and polymers are used to dose coagulants into clean water plants to remove peat, suspended solids and residual colors from clean water steams. In wastewater treatment, sophisticated polymers maximize plant throughput by increasing the solid separation rate allowing greater primary waste volumes to be treated per day:

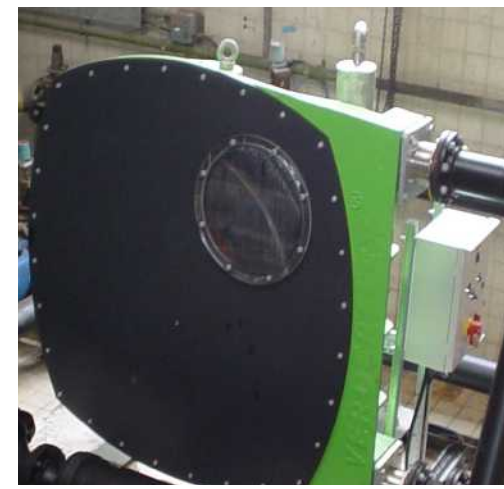
- Most polymers are highly shear sensitive
- High shear rate pumping solutions increase coagulant costs, lowering plant efficiency
- Over-dosing causes coagulant to be re-circulated into the plant inlet stream, this reduces the effectiveness of lime treatment, additionally increasing the costs of this operation
- In contrast, the gentle peristaltic action maximizes coagulant performance by maintaining the particle size and increases overall plant efficiency
- The linear flow-speed characteristic of Verderflex pumps allows accurate coagulant dosing rates, optimizing chemical usage
- Abrasive products create continual wear problems for many pumps leading to continual maintenance downtime and premature pump failures
- Peristaltic pumps are abrasion resistant, so they provide reliable and predictable service

Filter Presses and Waste Minimization

All water and wastewater treatment plants produce waste, which has to be prepared for disposal, usually by filter pressing, thickening or centrifuging to minimize volumes and constrain the waste processing costs. Usually such waste is sent to landfill or incinerated giving a disposal cost based on the waste's weight and volume. Dewatering challenge traditional pumping solutions:

- The waste is abrasive; creating stator wear, slip and consequentially the pump's flow drops
- Traditionally, to maintain flow rate, the pump speed is increased and the pump is operated with the a higher degree of wear. This causes increased leakage and results in abrasive wastes wearing on the shafts, rotor, seals and stator
- This creates variable suction performance and the suction pressure requirement increases creating "Rat Holes" (water is pulled from above the top of the sludge blanket) in the filter press feed, increasing the water content (the weight) and the volume of the pressed waste
- Dewatering operation costs are increased
- Verderflex pumps give consistent suction performance and do not suffer wear
- "Rat Holes" are eliminated, a more consistent, denser waste is produced

Transferring Sludge



Wastewater treatment plant primary sludge pumps have to transfer whatever is in the clarifier presenting many problems, even after the use of screens to remove rags, sand, grit, paper and other modern day debris:

- Traditional solutions such as progressive cavity pumps have high maintenance costs when rags become trapped around the stator
- Sludge can have a high grit content leading to persistent high maintenance costs due to abrasion and grit removal systems also being required
- Verderflex pumps are abrasion resistant
- They are a low cost of ownership solution, the only service part is the easily changed hose
- Verderflex pumps will pump rags, so that the rag removal screen can be located after the pump

To maximize digester performance, pumps have been fitted with turbidity monitoring systems so that low solid content sludge remains in the settling tank further increasing plant efficiency.

The Verderflex Range

The Verderflex High-Pressure Hose Pump Range

- Flows from 1 Gallon per Hour (GPH) to 370 Gallons per Minute (GPM)
- Discharge pressures up to 230 PSI
- Pumps can be supplied in either close coupled or long coupled (bare shaft) styles
- Port connections include ANSI 150lb, DIN, NPT and sanitary clamp
- Can be supplied with accessories including pulsation dampeners, gear drives, motors, variable speed drives, and a wide variety of related accessories

The Verderflex Hose

- 11 standard hose sizes from 5mm (3/16") to 125mm (5").
- Verderflex pumps are designed to maximize hose life by optimizing the hose's fatigue strength.
- Hoses are available in:
  - Natural Rubber for general purpose uses and abrasive chemicals
  - Nitrile Buna Rubber (NBR) for fatty acids and various petroleums
  - Food Grade NBR for food grade applications
  - EPDM for aggressive chemicals such as Ferric Chloride; low-strength Hypo
  - Hypalon® for extremely aggressive compounds such as Hypo and some Polymers
- Hoses have color coded identification tape bonded into the outer cover during manufacture to clearly identify material type

Verderflex Smart Tube Pump

- Flows from 0.01ml/min (0.0002 US GPH) to 10.2 l/min (161.7 US GPH)
- Maximum discharge pressures up to 4 bar (60 PSI)
- Four sizes of IP 55 Protected Digitally Controlled Programmable Multi Channel Tube Pumps
- Wide range of tube materials including Verderprene, Platinum Cured Silcon and StaPure®
- Easy-fit self adjusting Tube Saddle with intergral Saddle Status Detection (SSD)
- External interfaces : 0-10V, 4-20 mA, RS 232/485, SCADA
- Output 4-20 mA signal
- Optional leakage detection

StaPure® is a registered trademark of W L Gore

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